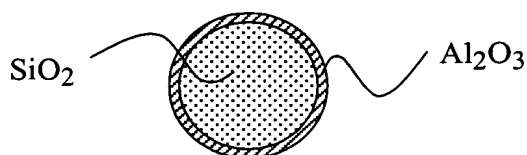


The present invention as defined in claim 1 is directed to an inorganic compound sol containing a dispersion medium having a dielectric constant from 10 to 85. Inorganic compound particulates having average particle size from about 11 to about 30 nm, whose surface has been modified by an organic compound which is selected from the class consisting of vinylsilane compounds, acrylsilane compounds, epoxysilane compounds, aminosilane compounds,  $\gamma$ -mercaptopropyltrimethoxysilane and  $\gamma$ -chloropropyltrimethoxysilane, are dispersed in the inorganic sol. The organic compound defined in claim 1 exhibits a molecular polarizability of from  $2 \times 10^{-40}$  to  $850 \times 10^{-40} \text{ C}^2\text{M}^2\text{J}^{-1}$ . The inorganic compound particulates of claim 1 are composite oxide particulates composed of silica and at least one inorganic oxide other than silica, with the weight ratio of silica to at least one inorganic oxide other than silica being 3 to 500, and wherein the inorganic compound sol is stable in the presence of species selected from the group consisting of ionic components, salts and surfactants. Dependent claim 5 further specifies that the inorganic compound sol defined in claim 1 is stable in the presence of ionic compounds.

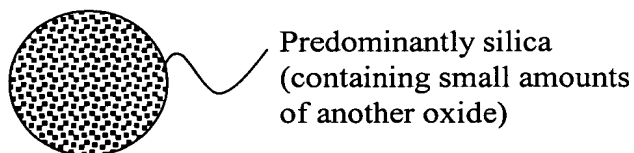
Claims 1 and 5 stand rejected under 35 U.S.C. § 102(b) for anticipation by PCT document WO 97/00995 to Minnesota Mining and Manufacturing Company (hereinafter "the '995 document"). The Examiner asserts that the '995 document discloses a coupling agent treated with silica sols and describes the sol designated P-4 as surface treated NALCOAG 1056, which is colloidal silica core with an  $\text{Al}_2\text{O}_3$  shell (~4%  $\text{Al}_2\text{O}_3$ ) suspension having a mean particle size of 20 nm and 30% solids content in water having a pH of 4.2.

The '995 document discloses a fluorochemical treatment composition comprising (a) a sol comprising a colloidal dispersion of substantially discrete, substantially monodisperse in size, polymer grafted, inorganic microparticles in liquid; and (b) at least one fluorochemical. The '995 document (pages 25 to 26) discloses coupling-agent-treated silica sols and defines the

sol P-4 as NALCOAG 1056, which is a colloidal silica core with an  $\text{Al}_2\text{O}_3$  shell (~4%  $\text{Al}_2\text{O}_3$ ) suspension having a mean particle size of 20 nm and 30% solids content in water having a pH of 4.2. As shown in the sectional view in the following diagram, the surface of the particle disclosed in the '995 document is composed of alumina.



In contrast, the composite oxide particle of claim 1 has a ratio of silica to at least one inorganic oxide other than silica being 3 to 500. In other words, the composite oxide particle of the present invention is a silica-rich particle. The sectional view in the following diagram shows the particle of the present invention.



The surface of the particle of claim 1 is predominantly a compound of silica. The surface properties of the sol particles determine their reactivity with coupling agents. Therefore, the composite oxide particle of claim 1 of the present invention differs from the particle of the '995 document.

In addition, the '995 document teaches the reaction of a surface modification compound with a colloidal particle, but not the step of displacement of water that is taught in the

present invention. Therefore, the sol obtained according to the present invention differs from that of the '995 document.

The processes taught in the '955 document and claimed in claim 1 of the present invention for the production of a sol differ because they have different purposes. It is not necessary, in the production of the sol of the '995 document, that water be displaced by another solvent. In the present invention, the solvent displacement results in the lowering of the electrolyte content and the production of a stable sol. This effect is not shown in the '995 document. Accordingly, the rejection of claims 1 and 5 over the '995 document is believed to have been overcome.

Claims 1 and 5 stand rejected under 35 U.S.C. § 102(b) for anticipation by U.S. Patent No. 3,689,300 to Bunger et al. (hereinafter "Bunger"). The Examiner asserts that Bunger discloses methacryloxypropyltrimethoxysilane treated silica sols, which are a suspension of colloidal silica (26% SiO<sub>2</sub>) modified with an Al<sub>2</sub>O<sub>3</sub> shell (~4% Al<sub>2</sub>O<sub>3</sub>) in which the particles have a mean particle size of 16 nm; the sol being homogeneous, having a 30% solids content in water and having a pH of 4.7. The Examiner concludes that, because the composition of Bunger and the composition of the present invention are the same, the two compositions would be expected to have the same properties. However, the modification of the colloidal silica described by Bunger results in a particle with a surface that is composed of alumina. The composite oxide particle of the present invention is a silica-rich particle, having a ratio of silica to at least one inorganic oxide other than silica of 3 to 500. Therefore, the composite oxide particle used in the present invention is different from that used in Bunger. In addition, Bunger does not teach the displacement of water that is taught in the present invention. Therefore, Bunger does not teach the surface modification of claim 1, and the sol obtained according to the present invention

differs from that of Bungler. For these reasons, the rejection of claims 1 and 5 over Bungler is believed to have been overcome.

Claims 1 and 5 stand rejected under 35 U.S.C. § 102(b) for purported anticipation by, or under 35 U.S.C. § 103(a) for purported obviousness over, United States Patent No. 5,935,700 to Enomoto et al. ("Enomoto") in view of United States Patent No. 5,316,714 to Yoneda et al. ("Yoneda"). The Examiner asserts that Enomoto discloses composite particles of silica and at least one other inorganic oxide other than silica, and that suitable particles range in size from 10 nm to 2 microns. The Examiner also asserts that Enomoto teaches that the composite oxides may be employed as an organosol in alcohols, glycols and ketones reading on the dielectric constant claimed for organic compounds in the present application. The Examiner further asserts that Enomoto teaches that the particles may be surface modified by silane coupling agents, and that a silica to other oxide ratio within a range of 3 to 500 may be used. The Examiner notes that the teachings of Enomoto differ from those of the present claims in that Enomoto does not teach the particular silane coupling agent of the present invention.

The Examiner asserts that Yoneda teaches glycol dispersions for imparting slipperiness to polyester films. The Examiner also asserts that Yoneda teaches coupling agents with molecular polarizabilities as claimed in the present invention for treating the particulate sols. Though Yoneda discloses numerous coupling agents, including those used in the present invention, Yoneda does not teach or suggest the specific selection of a coupling agent having the specific molecular polarizability claimed. Among the coupling agents disclosed by Yoneda, only glycidoxypolytrimethoxysilane and vinyltriethoxysilane fall within the scope of the present invention. Yoneda discloses, along with these two coupling agents, methyltrimethoxysilane (column 7, line 29). As can be seen in Comparative Example 2 in the present specification, an inorganic compound sol modified by methyltriethoxysilane is inferior in dispersion stability.


Because Yoneda teaches the use of methyltriethoxysilane, which is ineffectual in forming the composition of the present application, as equivalent to the use of glycidoxypropyltrimethoxysilane and vinyltriethoxysilane, Yoneda does not teach the utility of the latter two compounds in the present invention, or provide guidance concerning molecular polarizability of coupling agents. Specifically, Yoneda does not provide any motivation to select the coupling agents of the present invention. Accordingly, the combined teachings of Enomoto and Yoneda do not lead one of ordinary skill in the art to the invention set forth in claims 1 or 5 and do not render the present invention obvious. For these reasons, the rejection of claims 1 and 5 over Enomoto in view of Yoneda is believed to have been overcome.

In view of the above, it is submitted that the claims are patentable over the prior art of record and are in condition for allowance. Reconsideration of the rejections and allowance of claims 1 and 5 are respectfully requested.

Respectfully submitted,

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